

PEIRCE'S CONCEPTION OF LOGIC AS A
NORMATIVE SCIENCE

BY
ARTHUR W. BURKS

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LOGIC is a typical philosophical subject in that there is no general agreement as to what its function is. Some hold that logic should construct formal symbolic systems, others that it should study the nature of meaning, truth, and inference. Hence logicians disagree not only whether a given theory is correct or not, but whether it really does fall within the scope of logic as well. What is good logic to one philosopher may be, for example, poor psychology to another.

Since there is much disagreement on this matter nowadays, I should like to advance for consideration a view greatly neglected of late: the view that logic is a *normative science*. Perhaps some will look askance at such a conception as not even worthy of consideration, as a relic, perhaps, of an outmoded Hegelian logic. If so, I should like to point out that this was the opinion of one of the founders of modern symbolic logic. I am referring, of course, to Charles Sanders Peirce. Peirce not only regarded logic as a normative science (1.577),² but even went so far as to make it a branch of ethics (1.611, 1.573, 1.575, 5.35, 5.130, etc.). He tells us that logic divides arguments into the *good* and the *bad*, and he means to be taken literally (2.203).

Nor was this merely an isolated idea that Peirce toyed with. He arrived at it as the result of a careful study of the subject of logic and of the nature of philosophical studies as a whole.³ As he based most of his philosophy upon his logic, Peirce's conception of this subject throws considerable light on his thought. Hence a consideration of his conception of logic as a normative science is worthwhile, both because of what it reveals of Peirce and for what it offers in the way of a suggestion.

Since Peirce made such important technical contributions to symbolic logic, one might expect him to regard a logical calculus in its formal aspects as constituting the subject-matter of the deductive part of logic. Such is not the case (4.373). For example, he held the calculus of classes, as a formal, deductive, symbolic system, to

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² This and the following numerical references found in the text refer to the *Collected Papers of Charles Peirce*, edited by Charles Hartshorne and Paul Weiss and published by the Harvard University Press.

³ Peirce did not advance this conception of logic until late in life (2.197-8, 5.111, 5.129, and 1.573 note). Since he made his logical contributions without any such conception of the subject in mind, some might urge that this invalidates his views, but it seems to me that this makes them more worthy of consideration. The ideal time to formulate a conception of a subject is after one has worked in it, not before.

be a piece of mathematics, not logic. He defined mathematics in such a way as to include within it all necessary or deductive reasoning (1.54, 1.66, 3.364, 4.134, 4.233, 4.477, 5.8, 5.126, 5.145, 5.148, 5.590). Mathematics, he said, is the science which deduces necessary conclusions from assumed premises (3.558, 4.229). Thus it includes the working out of a consistent deductive system.

The mathematician, then, may be characterized as one who *practices* deduction (2.532, 4.239, 4.134, 4.242). According to this view much of contemporary symbolic logic becomes mathematics. It seems to me that such is the case. When, for example, a logician tests a sorites, or chain of reasoning, he is doing essentially what a mathematician does when he deduces a theorem from some postulates. Thus, if we have

All A is B

All B is C

All C is D

as three "postulates", we may deduce the "theorem"

All A is D.

That this deduction is merely a piece of simple mathematics is clearly shown by the fact that in the calculus of classes it becomes a simple algebraic problem.

In contrast to mathematics, which reasons deductively, deductive logic *studies* deductive reasonings or arguments. Similarly, inductive logic studies inductive arguments. Thus logic as a whole analyses arguments to discover their nature (1.575, 4.425).⁴ The logician is not interested in reaching conclusions, but in theories about their relations to premises (4.239, 4.370, 4.481, 4.533). As Peirce puts it, the purpose of logic is "to analyze reasoning and see what it consists in . . ." (2.532). The business of logic is "analysis and theory of reasoning, but not the practice of it" (4.134. Cf. 1.417, 4.242, 4.373).

In this logical analysis of deductive inferences mathematics plays a very important role, that of a tool. Thus there is something more to mathematical logic than mathematics. That something more is logic. Mathematical systems are the tool, deductive reasonings the subject-matter. Peirce regarded symbolic logic as "deductive logic—treated

⁴In order to make explicit the normative character of logic, we have been forced to treat logic as the study of arguments. Strictly speaking, the study of arguments comprises only one branch of logic, called by Peirce "Critic" (1.559, 2.229). Logic in general, or Semiotic, of which Critic is the second of three divisions, may be defined as the theory of signs; that is, a study of anything whose function is to represent something (1.192, 1.227, 1.444, 1.539, 2.93, 2.227, 4.9, 5.129, 5.488). Hence it includes a study of propositions and concepts as well as arguments (2.229, 1.559). But, as Peirce himself declares, the essence of logic is Critic, the study of arguments (2.203, 2.710, 4.9, 5.130, 5.159, 5.175). This is so because the proposition and the concept are degenerate forms of the argument; *i.e.*, truth and meaning are reducible to logical validity (5.142, 2.444 note, 3.440).

by means of a special system of symbols" (4.372; cf. 3.92, 3.364, 4.228, 4.240-4, 4.373, 4.424). In his own contributions to symbolic logic, Peirce tried to carry out this viewpoint. All the logical calculi he developed were attempts at an analysis of deductive reasoning (3.322, 3.364, 4.424, 4.533).

This conception of symbolic logic makes of it a philosophical subject, rather than a branch of mathematics.⁵ Now it seems to me that logic, and hence symbolic logic, is a part of philosophy rather than of mathematics. That is the traditional view, of course. The *Principia Mathematica* and Lewis's Systems of Strict Implication were worked out in this spirit. But since these monumental contributions the attitude has changed. Peirce would agree with those who hold that too much of recent symbolic logic has consisted in the development of the mathematical tool to the neglect of the logical subject-matter.

Peirce's conception of logic as the analysis of reasonings or arguments is broad enough to include all that rightfully belongs to the subject. He means it to include a study of concepts and propositions as well as arguments (see note 4). Thus the analysis of the idea of number found in *Principia Mathematica* and the analyses of the relation of logical entailment formulated in C. I. Lewis's Systems of Strict Implication fall within the scope of this conception of logic.

It may be objected that though the view that logic analyses arguments is a sound one, it hardly makes logic a *normative* science. That is true. Peirce arrived at his conception of logic as a normative science *after* he had analysed reasoning and concluded that it is normative in character.⁶ Hence we must turn to Peirce's own analysis of inferences.

Let us see what Peirce found the essence of reasoning to be.⁷

⁵ Symbolic logic need not be limited, of course, to a study of deductive inference. Any calculus of probability shows the utility of symbolism in inductive logic. Since material implication represents causality only in the Humian sense, one could, for example, formalize a stronger sense of causality. Such a system would be useful to those who hold that a causal relation is something more than a mere association of events (which can be expressed by the factual "... either ... or" of material implication), yet is not a deductive relation, since the cause does not logically necessitate the effect.

⁶ It should be said in defense of Peirce that he thought that the view that logic analyses reasonings does make it normative (1.575). This is because he conducted his analysis of reasoning by means of his category of Purpose or Thirdness. This category he regarded as prelogical, belonging to his science of phenomenology (1.219, etc.). Hence logic rests on phenomenology (1.186, 1.191, 1.352, 1.364, 5.37, 5.39, 5.121, 5.123, 5.126, 5.132). But, though his analysis of reasoning rests on phenomenology it seems clear that the doctrine that reasoning is deliberate thinking (*i.e.*, thinking governed by Purpose) is subsequent to, rather than prior to, this analysis of reasoning. Hence the first part of Peirce's logic is not normative. Incidentally, this may explain why Peirce arrived at his conception of logic as a normative science at such a late date.

⁷ If it be objected that we are here overlooking the distinction between an

Reasoning is, of course, a kind of thinking. It is that species of thinking which is deliberately and consciously controlled by norms or ideals. Thus Peirce analyses reasoning and finds it to consist of *deliberate, self-controlled thinking* (1.606, 5.130). Hence he defines logic as "the theory of deliberate thinking" (1.573).

It is only deliberate thinking which can be characterized as good or bad (1.604, 5.114). For *good* and *bad* when applied to thinking are moral terms, and moral criticism is useless unless directed against that which is deliberate and self-controlled (2.151, 2.165, 5.55, 5.108). "To criticize as logically sound or unsound an operation of thought that can not be controlled is not less ridiculous than it would be to pronounce the growth of your hair to be morally good or bad" (5.109). The only respectable kind of approval or disapproval is "that which will bear fruit in the future" (1.598, 5.182).

A man cannot be held responsible for conduct which is not under his control, since such conduct cannot be modified as a consequence of moral criticism. As a pragmatist Peirce regarded thinking as a kind of conduct (5.534), so that reasoning is a kind of deliberate conduct. It follows that a man can be held responsible for his reasonings. They may, therefore, be classified as good or bad. To divide arguments into the good and the bad is, as we said before, the task of logic.

By deliberate thinking Peirce means thinking controlled "with a view to making it conform to a purpose or ideal" (1.573). The purpose of thinking is, of course, to arrive at the truth.⁸ Reasoning is good, then, if it successfully resolves doubt and results in genuine knowledge (1.611, 1.575, 5.376, 5.563). But though truth is the aim of thinking, we cannot hold a man responsible for its attainment. This is because truth and falsity are not directly under a man's control. Peirce never doubted that there is an objective, absolute truth; but he was very sure that we could never be certain of it. Our relation to the universe does not permit us to have any perfect knowledge.

What, then, in the quest for truth is under a man's control? What can he be held responsible for? The answer is: his method of investigation. It is within his power to find an ideal method for pursuing the

argument and reasoning, it should be pointed out that for Peirce, as a pragmatist, no such distinction exists.

⁸We may note in passing that the end of thought is determined by esthetics. Esthetics, according to Peirce's view, is the science that tells us what the ultimate aim of anything is (1.611, 1.613, 5.132, 5.136). If it seems strange to say that esthetics determines the aim of thinking, remember that for Peirce the true is a species of the good (1.575). Thus he says of mathematical knowledge that it "is to be classed along with knowledge of our own purposes" (5.166). The ultimate aim of anything, esthetics informs us, is reasonableness or rationality. "In logic, it will be observed that knowledge is reasonableness . . ." (1.615). Since logic "supposes the question of what is to be aimed at to be already answered before it could itself have been called into being" (1.577), it rests on esthetics (2.198, 1.615).

truth. The discovery of such ideal methods is just the task of logic. They will serve as norms to guide our thinking. That is why logic is a *normative* science. By means of such methods we will most speedily reach the truth (1.615). They may sometimes lead us to erroneous conclusions, of course, but, if a method is really sound, our conclusions will turn out in the long run to be true. Thus Peirce says of inductive reasoning that it may, on occasion, lead us astray. Ultimately, however, it will bring us to an indefinite approximation to the truth and hence is justified as a method of reasoning (1.608).

We cannot consider here Peirce's discussion of the ideal method of investigation. That constitutes a part of the subject-matter of logic, whereas we are attempting only to delineate his conception of that subject. Yet we shall indicate briefly what he thought the normative method to be, because it plays such an important role in his philosophy as a whole. For that ideal method is none other than the method of the sciences, with which Peirce, himself a scientist of no small repute, was thoroughly familiar. Men can settle their beliefs, he says, by authority, or inclination, or any of various other methods. But there is no reason why authority, for example, should give the truth. It is a prerogative of the scientific method to bring a man's opinions in accord with the facts (5.387).

Peirce finds in the method of science many normative characteristics. Its essence is, of course, observation. But that observation cannot be conducted at random. Scientific observations are *deliberately* and consciously directed towards an end: the verification or disproof of an hypothesis. Again, scientific observation must have a moral character—it must be impartial and unbiased. Peirce is constantly emphasizing that the scientist should prize the truth above all else, especially above utility. Thus he believed the essence of scientific method to be deliberately directed, impartial observation.

Peirce's entire empiricism, for which he is so widely known, is just a broad generalization of the scientific method. He found the essence of scientific method to be so broad that he could include within it the methods of mathematics and metaphysics. The famous pragmatic method he regarded as merely an extension of scientific empiricism to the problem of ascertaining the meanings of words and concepts (5.465). Thus Peirce's concept of logic as a normative science turns out to be, from one point of view, the conception of logic as a study of scientific method, in the widest sense of that word.

Now we are in a position to see how Peirce came to regard logic as a branch of ethics. We said before that as a pragmatist he held thinking to be a kind of conduct, from which it follows that "self-controlled thinking [reasoning] is a special case of self-controlled conduct" (5.533). Now the study of selfcontrolled conduct in general is just ethics. Ethics studies the deliberate and conscious modification

of one's habits of action. It lays down the essential features of controlled conduct, which apply to the specific case of deliberate thinking (1.606). "Logical norms . . . correspond to moral laws" (1.609). Logic, then, rests on ethics (1.175, 1.191, 1.577, 1.591, 2.198).⁹

There are differences, of course, between logical and other moral conduct. Peirce admits that the element of will does not enter into logic as prominently as into ethics. Thus "an inference which self-criticism disapproves is always instantly annulled, because there is no difficulty in doing this" (1.609). Nevertheless, selfcontrol is characteristic of both morally good and logically good conduct. "The righteous man is the man who controls his passions. . . . A logical reasoner is a reasoner who exercises great self-control in his intellectual operations . . ." (5.130).

By making logic a branch of ethics Peirce would seem to be led to say that bad reasoning is immoral. This is precisely what he does say. Not every fallacy is a sin, he states, but "good reasoning and good morals are closely allied . . ." (1.576). He thinks that he can prove beyond dispute "that in order to reason well, except in a mere mathematical way, it is absolutely necessary to possess, not merely such virtues as intellectual honesty and sincerity and a real love of truth, but the higher moral conceptions" (2.82). I think that he would count altruistic love among these higher moral conceptions.

If it seems silly to say that altruistic love is an essential ingredient of good reasoning, let me remind you of some of Peirce's best known work—his work on the theory of induction. He held to a frequency-theory of probability. Critics of this theory have often pointed out that it fails to give meaning to a probability-value attached to a single event. A certain individual, for example, will want to know *his* chances of surviving a given operation. Since he is undergoing only *one* such operation, a statistical answer is meaningless.¹⁰ Peirce solves the difficulty by saying that he should be altruistic in his interests and consider all mankind, so that a statistical point of view is meaningful for him (2.654). Thus to reason in an inductive way a man must possess the high moral virtue of altruism.

Therefore, good reasoning is a species of moral conduct, and logic must look to ethics for the general principles of morality underlying good reasoning. Peirce even believed that a man must be moral in all of his conduct if he is to reason well and do much in science. He thought this belief to be verified by history. "It is a remarkable fact that . . . all history does not tell of a single man who has considerably increased human knowledge . . . having been proved a criminal" (1.576).

⁹ Peirce even went so far as to attribute the backward state of normative logic to an *ethical* difficulty—the lack of a settled opinion as to the end of logic (4.243).

¹⁰ For this example I am indebted to Professor C. H. Langford.

This is, I believe, pressing the point too far. Peirce forgets how frequent it is that a man is moral in one realm, immoral in another. Thus a man may treat his family with the greatest of consideration, yet be absolutely ruthless in his business relations. But we can agree with Peirce that "to avoid looking into the support of any belief from a fear that it might turn out rotten is as immoral as it is disadvantageous" (5.387). Integrity of belief is undoubtedly a virtue. Is it not the case that ignorance and bad reasoning account for quite as much evil in the world as does wrong intent?

For Peirce, then, logic is a normative science. It studies deliberate thinking, thinking consciously guided by ideals and norms. These norms or ideals Peirce regarded as ultimately *real*. Thus he was a realist in the original sense of that word—he believed in the *reality* of ideals. His technical contributions to symbolic logic are connected to this normative conception of logic in a direct and simple way: he employed his logical calculi to carry out a *realistic* analysis of thought. Those who hold that contemporary symbolic logic has been devoted too much to the defense of nominalistic and conventionalistic doctrines, can profitably turn to Peirce's conception of logic as a normative science.

ARTHUR W. BURKS

THE UNIVERSITY OF PENNSYLVANIA



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